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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/617,210	GERLACH, CHRISTIAN GEORG
	Examiner	Art Unit
	JAMES S. WOZNIAK	2626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5-9,11,13,15-18 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-9,11,13,15-18 and 20* is/are rejected.

7)☒ Claim(s) *21 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 February 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the office action from 3/11/2009, the applicant has submitted a Request for Continued Examination *(RCE)*, filed 4/6/2009, amending independent claims 1 and 7, while adding new claims 21-22 and arguing to traverse the art rejection based on the limitation regarding evaluating of an index by comparing the index of other optimal group vectors, wherein this comparison is performed in a different manner than a comparison between the group code vectors *(Amendment, Pages 12-13)*. Applicant's arguments have been fully considered, however the previous rejection is maintained due to the reasons listed below in the response to arguments.

2. In response to the previous 35 U.S.C. 112, first paragraph rejection, the applicant first argues that the specification, on page 10, lines 6-10, clearly "describes how the auto-correlation matrices are represented and how they are accessed and processed *(i.e., accessed simultaneously)*" which would allow a person of ordinary skill in the art to readily make and used the invention set forth in claim 5 *(Amendment, Pages 10-11)*.

The examiner does agree that the specification appears to be enabling with respect to the processing of autocorrelation matricies since Page 10 sets forth how a DSP is configured to process matrix elements, however, claim 5 recites a number of additional processes *(i.e., synthesis transfer function, pre-calculation, and post calculation)*. These additional processes have no accompanying descriptions outside of Pages 9-10, which merely reiterates the generic

parallel processing set forth in claim 5, and since these algorithms are different from the autocorrelation matrix processing it is not clear whether they would actually be performed in a similar manner in the DSP as is alleged by the applicant *(Amendment, Page 11)*. Thus, a person of ordinary skill in the art would not necessarily understand how these additional processes could be performed in a DSP based on a recitation regarding different speech processing algorithms in the form of autocorrelation matricies, especially since the applicant seems to consider the novelty of their invention to be the application of parallel processing in a DSP *("an additional reduction of execution time is achieved by generating/evaluating ...in parallel", Amendment, Page 11)*.

In response to the examiner's explanations provided in the Advisory Action from 3/11/2009, the applicant argues that because the processing of auto-correlation matricies is sufficiently described in the specification, one of ordinary skill in the art would clearly understand the application of parallel processing to the other types of CELP processing *(Amendment, Pages 11-12)*. In response, the examiner notes that, as was pointed out above, the other recited CELP processes of claim 5 are different from autocorrelation matrix processing, which does appear to be supported in the specification. Since these processes are different and are only generically described in the specification, it is unclear that they would be handled in the DSP in the same manner as the autocorrelation matricies, thus one of ordinary skill in the art would not know how to make and use the applicant's invention based on the specification.

Thus, the previous 35 U.S.C. 112, first paragraph rejection of claim 5 has been maintained.

Response to Arguments

3. Applicant's arguments have been fully considered but they are not persuasive for the following reasons:

With respect to independent claim 1, the applicant argues that Kwan et al *("Implementation of DSP-RAM: An Architecture for Parallel Digital Signal Processing in Memory," 2001)* fails to teach "comparing the index of each optimal group code vector with indices of other optimal group code vectors and wherein the comparing of the index of each optimal group code vector is different from a comparison between the group code vectors" because in their invention "indices are being compared with each other *(Amendment, Pages 12-13)*.

In response to this general allegation, the examiner notes that, in Kwan, a vector quantization codebook is divided up among a number of processing elements in a digital signal processor *(DSP) (Fig. 6)*. At this stage, Kwan determines a plurality of optimal group code vectors *(one at each processing element within the DSP)* by evaluating index positions with a scoring algorithm *(Section 3.3, Pages 344-345)*. Next these optimal codevectors within each processing element and each having an associated index *(Section 3.3, Page 344)* are evaluated by performing an overall best comparison or comparing each indexed vector's score with the others in the group. Overall then, in the case of determining the local best within each PE, Kwan uses a scoring algorithm that evaluates each index position and in the second case of determining the global best codevector, Kwan uses an algorithm that compares vector indexes with respect to a global score comparison *(Section 3.3, Page 345)*. Furthermore, Davidson et al *(U.S. Patent:*

4,868,867) provides another scoring algorithm for determining a local best that has low memory requirements in a DSP (Col. 12, Lines 15-59), which is also different from the global comparison. Therefore, since Kwan's local best algorithm does involve the comparison of indices via their assigned contents and the global best evaluation analyzes the best indices with respect to an overall best score, this argument has been fully considered, but is not convincing.

Next, the applicant argues that since Kwan discloses analyzing the code vector already within sequence there is "no rationale for providing the feature of comparing the indices to ensure conformity with the linear processes" *(Amendment, Page 13)*. In response, the examiner notes that the limitation "to ensure conformity with the linear processes" is an intended use to achieve a particular result. In order to meet such a limitation, the prior art reference would only be required to meet the claimed step/structure and the intended result would flow naturally therefrom *(See MPEP 2111.04- "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited.'" Id." and MPEP 2106 II(C))*. In this case, as described above, Kwan evaluates a codebook index for local and global bests by accessing and evaluating the assigned vector codewords with different scoring/comparison algorithms. Since, Kwan meets the claimed step/structure with an intended result flowing naturally therefrom and this intended result is not given patentable weight, this argument has been fully considered, but is not convincing.

Lastly, the applicant argues that Kwan merely discloses determining the lower error match within a PE and finding the closest matching code word overall, which allegedly does not involve a comparison between the indices *(Amendment, Page 13)*. In response, the examiner notes that the broad claim language which only requires that a comparison of the indices are

performed. In Kwan, as described above, an evaluation in finding a local PE best result is based on an error algorithm, wherein each index is evaluated based on its assigned vector. For a global best, a comparison between the index values with respect to their assigned error scores takes place. In both these processes, an index is ultimately evaluated. There is nothing in the independent claims to differentiate the applicant's comparison from that of the prior art because only a general comparison is claimed. Thus, this argument has been fully considered, but is not convincing.

The applicant traverses the art rejection of claim 7 for reasons similar to claim 1 *(Amendment, Page 13)*. In regards to such arguments, see the response directed towards claim 1.

The applicant traverses the art rejection of the dependent claims for reasons similar to claim 1 *(Amendment, Page 14)*. In regards to such arguments, see the response directed towards claim 1.

Claim Objections

4. **Claims 21-22** are objected to because of the following informalities:

In claims 21-22 "the group code vectors" and "between group code vectors" should be changed to --the optimal group code vectors-- and --between optimal group code vectors-- in order to provide proper antecedent basis for these limitations in the claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. **Claim 5** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 5 recites performing various CELP processing functions in parallel, however, the specification does not sufficiently describe such parallel processing. More specifically, the specification only describes a complex vector quantization technique implemented in a parallel processor in detail and merely makes a general mention that parallel processing can be applied to the other CELP functions *(Pages 9-10)*. This general mention of parallel processing does not specifically explain how the various CELP coding processes would be performed in parallel *(as is the case with vector quantization)*, and thus, the specification would not enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention recited in claim 5.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. **Claims 1, 3, 5-9, 11, 13, 15-18, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwan et al *("Implementation of DSP-RAM: An Architecture for Parallel Digital Signal Processing in Memory," 2001)* in view of Davidson et al *(U.S. Patent: 4,868,867)*.

With respect to **Claim 1**, Kwan recites:

K code vectors is provided for vector quantization of a signal vector representing a set of signal values of said audio or speech signal *(codeword vectors corresponding to a speech signal, Section 3.3, Page 344)*,

Performing a codebook search for determining an optimal code vector of said codebook, wherein said codebook search is performed in parallel by *(codebook search performed in parallel, Section 3.3, Pages 344-345)*:

Dividing the codebook into a plurality of codebook groups *(distributing a voice codebook over multiple processing elements, Section 3.3, Pages 344-345; and Fig. 6)*;

Simultaneously determining a plurality of optimal group code vector each of which corresponds to one of said plurality of codebook groups *(simultaneously determining a lowest error vector match with each divided codevector set, Section 3.3, Pages 344-345)*; and

Determining an optimal code vector of said codebook from the plurality of optimal group code vectors *(finding the closest matching codevector over all of the processing elements, Section 3.3, Pages 344-345)*; and

Outputting the code vector *(sending optimal code vectors, Section 3.3, Page 344)*,

Wherein said determining of said optimal code vector among said plurality of optimal group code vectors comprises evaluating an index of each optimal group code vector uniquely identifying each optimal group code vector within said codebook *(speech vectors having a defining index at which the vector is located, Section 3.3, Page 344, which is analyzed to access the corresponding optimal vector for each group to determine/calculate the overall best codevector, Section 3.3, Pages 344-345)*; and

Wherein the evaluating the index comprises comparing the index of each optimal group code vector with indices of other optimal group code vectors and wherein the comparing of the index of each optimal group code vector is different from a comparison between the group code vectors *(performing local index evaluation in processing elements through an error score algorithm and global optimal index evaluation through index comparison of optimal codevectors output from the processing elements, Section 3.3, Pages 344-345).*

Although Kwan notes that several different error functions can be used to determine an optimal vector *(Section 3.3, Page 344)*, Kwan does not explicitly teach the use of a cross-multiplication expression as a means for vector selection. Such an expression, however, is well known in the speech coding art as is evidenced by Davidson (*Col. 12, Lines 15-59).*

Kwan and Davidson are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Kwan with the cross-multiplication expression taught by Davidson in order to provide a comparison scheme that is suitable for a DSP that has low memory requirements *(Davidson, Col. 12, Lines 52-54).*

With respect to **Claim 3**, Kwan recites the parallel process for encoding a voice signal as applied to Claim 1. Although Kwan does not explicitly describe the entire encoding process in detail, including a shape-gain step, such a step is well known in the speech coding art as is evidenced by Davidson *(Col. 16, Lines 32-56)*.

Kwan and Davidson are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Kwan with the well known gain factor taught by Davidson in order to provide information required for speech synthesis at a decoder that also minimizes distortion in a reproduced speech signal *(Kwan, Col. 3, Lines 7-18)*.

With respect to **Claim 5**, Kwan discloses full implementation of a CELP coder/decoder and explains parallel processing for an aspect of the full process *(Sections 3.3-4, Pages 344-345)*, while Davidson further discloses well-known CELP processing means including a synthesizing section and stored auto-correlation/impulse response matricies *(Col. 12, Line 60- Col. 13, Line 19; Col. 14, Lines 15-56; and Fig. 5)*.

With respect to **Claim 6**, Kwan further discloses:

The codebook comprises pulse code vectors *(CELP codevectors, which comprise excitation pulse vectors, Section 3.3, Page 345)*.

With respect to **Claim 7**, Kwan teaches the method of claim 1 and further discloses:

A processor with configurable hardware and/or with acceleration means specifically designed for said method is used for parallel execution of steps of said method *(digital signal processor (configurable hardware) with parallel processing elements (i.e., acceleration means) for faster codebook searching (acceleration means), Fig. 6)*.

With respect to **Claim 8**, Kwan further discloses:

The processor provides means for simultaneously accessing a plurality of said signal values located in a memory *(simultaneously accessing many stored code vectors in parallel processing elements, Section 3.3, Pages 344-345).*

With respect to **Claim 9**, Kwan further discloses:

A standard processor further comprising a calculation module, is used for parallel execution of steps of said method, and wherein said steps of said method are optimized regarding calculation means of said standard processor and/or execution time *(DSP programmed calculation means used to enable parallel speech coding with increased speed and efficiency, Section 3.3 and 4, Pages 344-345).*

With respect to **Claim 11**, Kwan further discloses:

Coder and decoder, in particular speech and/or audio signal CODEC, capable of performing a method according to claim 1 *(voice coding and decoding, Section 3.3 and 4, Pages 344-345).*

With respect to **Claim 13**, Kwan further discloses:

The processor is a digital signal processor *(DSP, Sections 3.3 and 4, Pages 344-345).*

With respect to **Claim 15**, Kwan further discloses:

A plurality of calculation units, each of which determines optimal code group vectors of a respective one of the plurality of codebook groups, wherein the plurality of calculation unit execute said determining simultaneously *(plurality of parallel processing elements that each determine a best match within each codevector set, Section 3.3, Page 345 and Fig. 6).*

With respect to **Claim 16**, Kwan further discloses:

Each codebook group comprises a number of code vectors wherein the number of code vectors is a fraction of the plurality of code vectors (codebook is divided into smaller codevector sets, Fig. 6).

With respect to **Claim 17**, Kwan further discloses:

Each code vector is uniquely identifiable by a unique index *(code vectors are each assigned an index, Section 3.3, Page 344).*

With respect to **Claim 18**, Kwan further discloses:

The code vectors contained in a first codebook group are mutually exclusive from the code vectors contained in a second codebook group *(different codebook sets are assigned to each processing element to increase searching speech, Fig. 6; and Section 3.3, Page 345).*

With respect to **Claim 20**, Kwan further discloses:

Evaluating an index of each optimal group code vector ensures conformity with a linear search method *(evaluation of different codeword indexes in a vector search conforms to the coding search standards used in a typical linear search, Section 3.3, Page 344).*

Allowable Subject Matter

9. **Claim 21-22** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and amended to overcome the above claim objections.

10. The following is a statement of reasons for the indication of allowable subject matter:

With respect to **Claims 21-22**, the prior art of record fails to explicitly teach or fairly suggest, either individually or in combination, a method and system that codes a speech signal by dividing a codebook into different codebook groups, determining an optimal code vector within each group simultaneously using a cross-multiplication expression calculated in parallel, and determining an optimal overall codevector from the plurality of optimal group codevectors while further evaluating an index *(as set forth in claims 1 and 7)* when one or more optimal group code vectors have equal cross-multiplication results by selecting a vector with the smallest index, as set forth in claims *(as is set forth in claims 21 and 22).*

Most pertinent prior art:

Kwan et al *("Implementation of DSP-RAM: An Architecture for Parallel Digital Signal Processing in Memory," 2001)* makes it known that performing vector quantization of a speech signal by dividing a codebook into different groups, placing those groups within different digital signal processing elements, evaluating codebook indices by determining an error score for each index, selecting a local best codevector index within each processing element, and comparing the local best codevector indices to determine an overall codevector result *(Section 3.3., Pages 344-345; and Fig. 6)* is well known in the speech coding art. Kwan does not teach that a optimal group code vector is selected based on a cross multiplication product as is set forth in claims 1 and 7 nor the evaluation of an index by selecting a smaller index value when cross product results are equivalent because Kwan teaches the use of an L2 norm in evaluation of a optimal group codevector. Thus, while Kwan does teach a very similar parallel processing vector quantization within a digital signal processor, Kwan does not fully anticipate the applicant's claimed invention.

Davidson et al *(U.S. Patent: 4,868,867)* overcomes some of the deficiencies in the teachings of Kwan by evidencing that the cross product calculation for indexed vector analysis is well known in the art *(Col. 12, Lines 15-59)*. Davidson, however, fails to provide a means for dealing with equivalent cross product results that involves selecting a code vector having a smallest index as is set forth in claims 21-22.

Thus, claims 21-22 contain allowable subject matter over the prior art of record.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: See PTO-892.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached at (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/James S. Wozniak/
Primary Examiner, Art Unit 2626